SAFETY PLAN

FOR

REVERE COPPER AND BRASS

PCB SPILL AND ABANDONED DRUMS

SITE SAFETY PLAN

Project Name: REVERE COPPER AND BRASS
PCB spill and abandoned drums

ERCS Delivery Order #:

TAT Technical Direction Document #: PCS 1459, TDD# 05-8803-15

Prepared in Conjunction With

The U.S. Environmental Protection Agency,

______________________,

and

Roy F. Weston, Inc.

FOR:

The U.S. Environmental Protection Agency

Region V - Emergency Response Section

Adopted By: Richard C Mrawczik Date: 3-18-88
For Inland Waters
verbal - Tami Ruukowski 3-17-88

Adopted By: ______________________ Date: ________
For Roy F. Weston, Inc.

Adopted By: ______________________ Date: ________
For U.S. EPA

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- CONFINED SPACE ENTRY PROCEDURES
- CHEMICAL HAZARD INFORMATION (MSDS Sheets)
- LIQUID TRANSFER SOP
- DRUM HANDLING SOP
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- SITE ENTRY SOP
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INTRODUCTION

This document describes the health and safety guidelines developed for this project to protect on-site personnel and the public from physical harm and exposure to hazardous materials or wastes. The procedures and guidelines contained herein were based upon the best available information at the time of the plan's preparation. Specific requirements may be revised if, during the course of the project, new information is received or conditions change which would warrant modification to ensure the safety of workers or the public. A written amendment will document all changes made to the plan. Amendments to this plan are included in Attachment A. Where appropriate, specific OSHA standards or other guidance will be cited and applied.

DAILY SAFETY MEETINGS

Daily safety meetings will be held at the start of each shift to ensure that all personnel understand site conditions and operating procedures, to ensure that personal protective equipment is being used correctly and to address worker health and safety concerns.

SITE SAFETY PLAN ACCEPTANCE

The OSC or designated representative shall be responsible for informing all personnel entering the exclusion zone of the contents of this plan and ensuring that each person signs the Safety Plan Acceptance Form in Attachment B. By signing the Safety Plan Acceptance Form, individuals are recognizing the hazards present on-site and the policies and procedures required to minimize exposure or adverse effects of these hazards.

TRAINING

All personnel entering the exclusion zone must have completed training requirements for hazardous waste site work in accordance with OSHA 29 CFR 1910.120, or be qualified by previous training or experience. Documentation of training requirements is the responsibility of each employer and is available in individual corporate offices.

MEDICAL MONITORING

All personnel entering the exclusion zone must have completed appropriate medical monitoring requirements required under OSHA 29 CFR 1910.120(f). Documentation for all personnel is available from each employer. If there are additional site specific medical monitoring requirements for this site, evidence of compliance must also be included.

FIT TESTING

All personnel entering the exclusion zone using a negative pressure respirator must have successfully passed a qualitative respirator FIT test in accordance with OSHA 29 CFR 1910.1025; 1926.58; or, ANSI within the last 12 months. Documentation for all contractors is the responsibility of each employer and is available in individual corporate offices. If applicable, quantitative FIT testing is required for the use of negative pressure respirators for protection against airborne asbestos fibers and lead.

1.0 PROJECT ORGANIZATION AND PERSONNEL

On-Scene Coordinator (OSC):

The OSC, as the representative of the U.S. EPA, is responsible for overall project administration and for coordinating health and safety standards for all individuals on-site at all times. All OSHA standards 29 CFR Parts 1900 to 1910 (General Industry) and Parts 1926/1910 (Construction Standards) shall be applied. However, each contractor (as an employer under OSHA) is also responsible for the health and safety of its employees. If there is any dispute with regards to health and safety, the following procedures shall be followed:

1) Attempt to resolve the issue on-site; and,

2) If the issue cannot be resolved, on-site personnel shall consult off-site supervisors for assistance and the specific task operation in dispute shall be discontinued until the issue is resolved.

Response Manager:

The Response Manager, as the field representative for the primary clean-up contractor, has the responsibility for fulfilling the terms of the delivery order. He must oversee the project and ensure that all technical, [redacted] and safety requirements are met. It is his duty to keep the project on schedule, within budget and to communicate daily with the OSC regarding site clean-up progress.

REGULATORY

Technical Assistance Team:

The Technical Assistance Team (TAT) is responsible for providing the OSC with assistance and support in regards to all technical, [redacted] and safety aspects of site activity. The TAT is also available to advise the OSC on matters relating to sampling, treatment, packaging, labeling, transport, and disposal of hazardous materials, but is not limited to the above-mentioned.

REGULATORY

Site Safety and Health Officer:

The Site Safety and Health Officer, or a designated alternate, is responsible for implementation of this Site Safety Plan and for ensuring that amendments to this plan are instituted as appropriate.

1.1 Key Personnel and Health and Safety Personnel

U.S. EPA On Scene Coordinator: Pete Neithercut OSC

Bob Bowles ALT OSC

Alternate On-Scene Coordinator:

Principle Contractor: Tetland Waters

Contractor Representative:

Subcontractors:

Site Health & Safety Officer:

Alt. Health & Safety Officer:

Technical Assistance Team (TAT): Roy F. Weston, Inc.,
111 North Canal, Suite 855
Chicago, Illinois 60606
312/993-1067

TAT Representatives: Mike Turnbill

Dan Coyne

Tim Off

Other:

1.2 SITE BACKGROUND AND SCOPE OF WORK

1.2.1 Site Background

OSC Neithercut advised of abandoned drums and transformers on 3/15/88. TAT samples two pools of liquid amongst several abandoned drums and two transformer carcasses on 3/15/88. Analysis on samples received on 3/16/88. Sample #3 contained 114,000 ppm PCBs. Sample 593 contained [illegible] ppm PCB.

1.2.2 Scope of Work for Contractor

ERCS

- Mobilize tractor hoe, RP, Foreman, operator, and 2 laborers.
- Collect all standing oil into overpacks.
- Overpack all drums containing materials
- Excavate inadequate amount of soil in spill area.
- Assist TAT with drum sampling

1.2.3 Scope of Technical Direction Document for TAT

- Provide OSC with assistance and support in regards to all technical, regulatory, and safety aspects of site activities.
- Sample drums of unknown material
- Monitor contractor operations.
- Provide health and safety plan for site

2.0 TASK SAFETY AND HEALTH RISK ANALYSIS

This Hazard Assessment identifies the general hazards associated with specific site operations and presents an analysis of documented or potential chemical hazards that exist at the site. Every effort must be made to reduce or eliminate these hazards. Those which cannot be eliminated must be guarded against by use of engineering controls and/or personal protective equipment.

2.1 Activity Specific Hazards and SOPs

2.1.1 Hazards and SOPs Associated with Polychlorinated biphenyls: PCB's

PCB's refer to a chemical substance limited to the biphenyl molecule that has been chlorinated to varying degrees. The higher the percent of chlorine the more toxic it is. Animal studies have shown PCBs to be extremely toxic in low concentrations. Routes of exposure for PCBs can be respiratory, skin contact, ingestion and eye irritation. All workers involved with the removal of the PCB liquid or PCB contaminated debris should wear the proper protective clothing at all times. Level C will be required when handling PCB contaminated material.

2.1.2 Hazards and SOPs Associated with Drum Handling and Sampling

All drum sampling will be conducted in level B protection. Be aware of splashing material from drums - wear splash shield.

~~Be sure to use non sparking wrench when opening bungs.~~

Drum handling will be done with a drum ~~handling~~ and backhoe. Make sure sling is secure and be aware of swinging drums. Wear hard hats at all times.

2.2 General Site Hazards

Lighting - Work areas must have adequate lighting for employees to see to work and identify hazards (5-foot candles) minimum comparable to a single 75-100 watt bulb). Personnel should carry flashlights in all normally dark areas for use in the event of a power failure. Applicable OSHA standards for lighting - 29 CFR 1910.120 (m) - Illumination shall apply.

Electrical Power - All electrical power supplied by a generator or used in outdoor or wet locations must have a ground fault circuit interrupter as part of the circuit. All equipment must be suitable and approved for the class of hazard. Applicable OSHA standards for electrical - 29 CFR 1926 Subpart "K" shall apply.

Walkways, etc. - Damaged and deteriorated buildings often contain unguarded walkways, doors, etc. where a fall potential exists. These must be guarded and/or posted to prevent employee use or passage. Areas where work will not be performed will be closed off and posted. Applicable OSHA standards for walkways, stairways, etc. - 29 CFR 1926.500 shall apply.

High or elevated work - All work over four-foot in elevation or where a fall potential exists will be performed using appropriate ladders and/or fall protection (i.e. body harness and lifeline).

Drum Handling - The movement and opening of drums will be done in accordance with 29 CFR 1910.120 (j).

Cold Stress - When the temperature falls below 40°F, cold stress protocol should be followed. Employees must be supplied with adequate clothing to maintain core temperature. To minimize the potential for hypothermia the decon line will be enclosed with plastic sheeting and heated with forced air from the clean end. Cold stress is discussed in detail in Attachment D.

Heat Stress - When the temperature exceeds 75°F and personnel are wearing protective clothing, a heat stress monitoring program shall be implemented as appropriate. Employees shall have access to break periods and drinking water as necessary. Heat stress is discussed in detail in Attachment E.

Eye Wash Protection - All operations involving the potential for eye injury, splash, etc., must have approved eye wash units locally available as per OSHA 29 CFR 1910.151 (c)

Fire Protection/Fire Prevention - Operations involving the potential for fire hazards shall be conducted in a manner as to minimize the risk. Non-sparking tools and fire extinguishers shall be used or available as appropriate. Sources of ignition shall be removed.

Utilities - Overhead and underground utility hazards shall be identified and or inspected prior to conducting operations involving potential contact.

2.3 Chemical Hazard Assessment

Previous sampling and analytical data have indicated that the following chemical hazards, either documented or potential, exist at the site. Detailed hazard information for these chemicals is presented in Attachment __ or available at the command post.

Contaminant	TLV/PEL	IDLH	Physical Characteristics	Route of Exposure	First Aid	Comments
Polychlorinated biphenyls	0.5 to 10 mg/m³	—	Clear to pale yellow mobile liquids and some solids. Waxlike, bitter odor	Inh, Ing., skin contact,	Move victim out of spill area. Remove clothing and thoroughly wash affected skin with water/soap. Ingestion: rinse mouth with water - get medical attention	

3.0 TRAINING, MEDICAL MONITORING AND FIT TESTING

Refer to Introduction and Site Entry Requirements Section.

4.0 PERSONAL PROTECTIVE EQUIPMENT

The following is a brief description of the personal protective equipment which may be required during various phases of the project. The U.S. EPA terminology for protective equipment will be used; Levels A, B, C and D.

Respiratory protective equipment shall be NIOSH-approved and use shall conform to OSHA 29 CFR Part 1910.134 Requirements. Each EMPLOYER shall maintain a written respirator program detailing selection, use, cleaning, maintenance and storage of respiratory protective equipment.

4.1 Level A Protection Shall Be Used When:

- The extremely hazardous substance requires the highest level of protection for skin, eyes and the respiratory system;
- Substances with a high degree of hazard to the skin are known or suspected;
- Chemcial concentrations are known to be above "safe" levels;
- Biological hazards are known or suspected; or,
- Unknown organic vapor concentrations range from 500 - 1,000 ppm.

4.1.1 Level A Protective Equipment at a Minimum Shall Consist of:

- Fully encapsulating exposure suit (selected for resistance to chemical(s) at the site);
- Chemical resistant boot covers worn over safety-toe work boots [redacted];
- Chemical resistant outer gloves (disposable);
- Chemical resistant inner gloves (disposable);
- Pressure demand SCBA or airline system with egress bottles;
- Hard-hat;
- Disposable outer suit (optional);
- Use of the "buddy system" for site entry personnel and appropriate back-up support personnel.

4.4 Level D Protection Shall Be Used When:

- The atmosphere contains no known hazard; and,
- Work functions preclude splashes, immersion or the potential for unexpected inhalation of, or contact with, hazardous levels of any chemicals.

4.4.1 Level D Protection Equipment at a Minimum Shall Consist of:

- Standard work uniform or coveralls;
- Safety-toe work boots;
- Gloves as needed;
- Safety glasses, as needed;
- Splash shield as needed; and,
- Hard-hat.

4.5 Additional Safety Equipment Which May Be Required For Specific Tasks

- Chemical-resistant aprons;
- Acid suits;
- Goggles;
- Face shields;
- Five-minute escape device;
- Welders goggles or shields; and,
- Hearing protection.

4.5 Activity Specific Levels of Protection

The required level of protection is specific to the activity being conducted. At this site the minimum levels of protection are as follows:

Activity	Level of Protection	Special Requirements
Removal of PCB liquid and contaminated material	~~B~~ C	
Drum Sampling and Overpacking	B	
Contractor Monitoring	C	
Support Zone	D	

5.0 MEDICAL MONITORING REQUIREMENTS

Refer to Introduction and Site Entry Requirements Section.

6.0 AIR MONITORING AND ACTION LEVELS

According to 29 CFR 1910.120 (h) Air Monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection needed on-site.

6.1 Routine Air Monitoring at a Minimum Shall be Conducted:

- Upon initial entry to rule out IDLH conditions;
- When the possibility of an IDLH condition or flammable atmosphere has developed;
- When work begins on a different portion of the site;
- Contaminants other than those previously identified are being handled;
- A different type of operation is initiated; and,
- Employees are handling leaking drums or containers or working in areas with obvious liquid contamination.

Air monitoring will consist at a minimum of the criteria listed below. All air monitoring data will be documented and submitted to the OSC and available in the command post site files for review by all interested persons. Air monitoring instruments will be calibrated and maintained in accordance with the manufacturer's specifications.

Instrument	Compounds To Detect	Frequency	Comments/ Action Level
HNU	Organic Vapors		0-5 ppm — Level C 5-500 ppm — Level B > 500 ppm — exit
CGI	% LEL / % O_2		> 20% LEL / < 19.5% O_2 > 25% O_2 Exit
Radiation Meter	Radiation		> 10 mr/h — exit

7.0 SITE CONTROL AND STANDARD OPERATING PROCEDURES

7.1 Work Zones

The primary purpose for site controls is to establish the hazardous area perimeter and to prevent access or exposure to hazardous materials by unauthorized persons. At the end of each workday, the site must be secured and guarded, if necessary, to prevent unauthorized entry. These zones will include:

7.2 Exclusion Zone

The exclusion zone will be the "hot-zone" inside the site perimeter. Entry to and exit from this zone will be made through a designated point at the decontamination zone boundary and all personnel will be required to sign the hot zone entry/exit log located at the decon area. Appropriate warning signs to identify the exclusion zone should be posted (i.e. "DANGER - AUTHORIZED PERSONNEL ONLY", "PROTECTIVE EQUIPMENT REQUIRED BEYOND THIS POINT", etc.) Exit from the exclusion zone must always be accompanied by personnel and equipment decontamination as described in Section 8.0.

7.3 Decontamination Zone

The decontamination zone will provide a location for removal of grossly contaminated personal protective equipment and final decontamination of personnel and equipment. All personnel and equipment should exit only via the decon corridor. A separate decontamination area will be established for heavy equipment.

7.4 Clean Zone

This uncontaminated support zone or clean zone will be the area outside the exclusion and decontamination zones and within the geographic perimeters of the site. This area is used for staging of materials, parking of vehicles, office and laboratory facilities, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the exclusion zone. There will be one controlled entry/exit point from the clean zone to the decontamination zone.

All personnel arriving in the support zone should upon arrival, report to the command post and sign the site entry/exit log.

A map of the work zones for this site follows and includes the location of emergency equipment and utilities.

See Attachment D

7.5 General Field Safety and Standard Operating Procedures

- The "buddy system" will be used at all times by all field personnel. No one is to perform field work alone. Maintain visual, voice or radio communication at all times.
- Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces. Walk around (not through) puddles and discolored surfaces. Do not kneel on the ground or set equipment on the ground. Stay away from any waste drums unless necessary. Protect equipment from contact by bagging.
- Eating, drinking, or smoking is permitted only in designated areas in the support zone.
- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activities.
- Beards or other facial hair that interferes with respirator fit are prohibited.
- The use of alcohol or drugs is prohibited during the conduct of field operations.
- All equipment must be decontaminated or discarded upon exit from the exclusion zone.
- All personnel exiting the exclusion zone must go through the decontamination procedures described in Section 8.0.
- Safety Equipment described in Section 4.0 will be required for all field personnel unless otherwise approved by the Site Health and Safety Officer.
- Practice administrative hazard control for all site areas by restricting entrance to exclusion zones to essential personnel and by using operational SOPs.

8.0 DECONTAMINATION PROCEDURES

In general, everything that enters the exclusion zone at this site, must either be decontaminated or properly discarded upon exit from the exclusion zone. All personnel, including any state and local personnel must enter and exit through the decon area. Prior to demobilization, contaminated equipment will be decontaminated and inspected by the OSC before it is moved into the clean zone. All material that is generated by decontamination procedures will be stored in a designated area in the exclusion zone until disposal arrangements are made.

All personnel must sign the "HOT ZONE ENTRY/EXIT LOG" when entering and exiting the exclusion zone. Equipment entry/exit must also be documented.

NOTE: The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for this site is Soap and water. Decontamination solution will be changed daily (at a minimum) and collected and stored on-site until disposal arrangements are finalized.

8.1 Procedures for Equipment Decontamination

Following decontamination and prior to exit from the hot zone, the OSC or a designated alternate, shall be responsible for insuring that the item has been sufficiently decontaminated. This inspection shall be included in the site log.

8.2 Procedure for Personnel Decontamination

This decontamination procedure applies to personnel at this site wearing Level B and C protection. These are the minimum acceptable requirements:

Station 1: Segregated Equipment Drop

Deposit equipment used on-site (tools, sampling devices and monitoring instruments, radios, etc.) on plastic drop cloths. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

Station 2: Outer Boot and Outer Glove Wash and Rinse

Scrub outer boots and outer gloves with decontamination solution or detergent water. Rinse off using large amounts of water.

Station 3: Outer Boot and Glove Removal

Remove outer boots and gloves. If outer boots are disposable, deposit in container with plastic liner. If non-disposable, store in a clean dry place.

Station 4: Outer Garment Removal

Remove Chemical Resistant Outer Garments and deposit in container lined with plastic. Dispose of splash suits as necessary.

Station 5: Respiratory Protection Removal

Remove face-piece, and if applicable, deposit SCBA on plastic sheets. APR cartridges will be discarded daily or earlier upon breakthrough. Wash and rinse respirator at least daily. Wipe off SCBA and store in safe place.

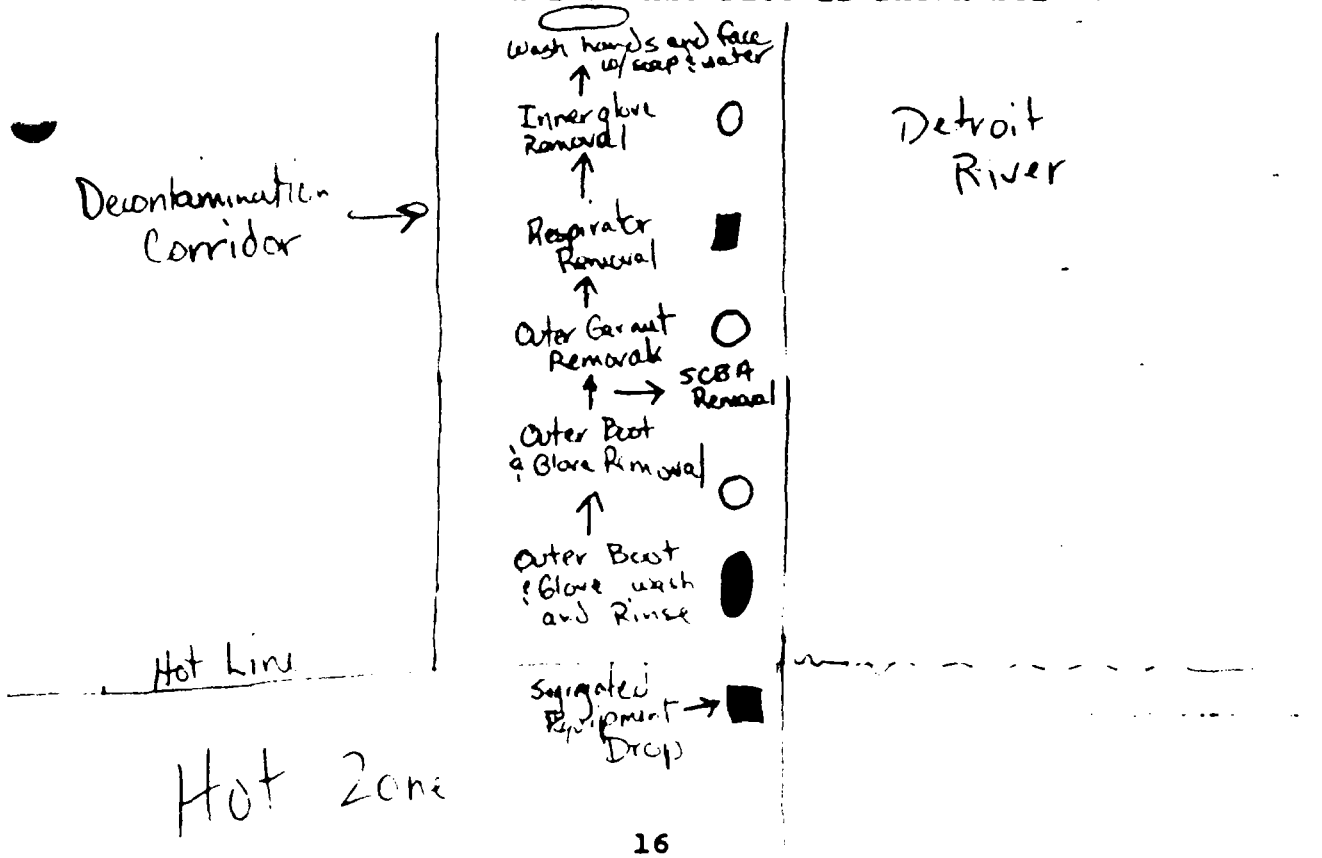
Station 6: Inner Glove Removal

Remove inner gloves. Deposit in container for disposal.

Station 7: Field Wash

Thoroughly wash hands and face with soap and water. Shower as soon as possible.

A sketch of the decon area for this site is shown below.



9.2 Project Personnel Responsibilities

ON-SCENE COORDINATOR (OSC)

As the primary administrator of the project, the OSC has primary responsibility for responding to and correcting emergency situations. The OSC must:

- Take appropriate measures to protect personnel including: withdrawal from the exclusion zone, up-grading the level of protective clothing and respiratory protection, or total evacuation and securing of the site.
- Take appropriate measures to protect the public and the environment including isolating and securing the site, preventing run-off to surface waters and ending or controlling the emergency to the extent possible.
- Ensure that appropriate Federal, State and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation! In the event of a spill, sanitary districts and drinking water systems may need to be alerted.
- Ensure that appropriate treatment or testing for exposed or injured personnel is obtained;
- Determine the cause of the incident and make recommendations to prevent the recurrence; and,
- Ensure that all required reports have been prepared.

RESPONSE MANAGER (RM)

The RM must immediately report emergency situations to the OSC, take appropriate measures to protect site personnel and assist the OSC as necessary in responding to and mitigating the emergency situation.

TECHNICAL ASSISTANCE TEAM (TAT)

The TAT must immediately report emergency situations to the OSC, take appropriate measures to protect site personnel and assist the OSC as necessary.

9.0 EMERGENCY RESPONSE PLAN

It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies.

9.1 Emergency Contacts

Fire: 911

Police: (313) 297-9300

Ambulance: (313) 875-9305

Hospital: (313) 745-3374

Address: 4201 St. Antoine

Telephone: 745-3374 **Chemical Trauma Capabilities?** Y

Poison Control Center: _____

Directions from Site to Hospital (See Map on Following Page):

W. Jefferson to Livernois north
Livernois north to I-75 east to "Medical Center" exit follow signs to Emergency Entrance

NOTE: Maps and directions to the hospital will be posted in the office, decon trailers and decontamination area.

The route to the hospital was verified by: _____ on _____. Distance from site to hospital _____. The fire, police, and hospital were notified of site operations by _____ on _____.

The following individuals have been trained in CPR and First Aid:

_____ _____

_____ _____

_____ _____

CHECK ALL NUMBERS

9.2 Additional Emergency Numbers

National Response Center	✓ 800-424-8802
Center for Disease Control	✓ 404-488-4100 (24 hr)
	~~404-329-3888 (night)~~
~~National Poison Control Center~~	~~800-942-5969~~
Pesticide Information Service	~~800-845-7633~~
AT&F (Explosives Information)	✓ 800-424-9555
Chemtrec	✓ 800-424-9300
State Environmental Agency	_____

Maecorp, Inc. Contacts	✓ 1-800-EPA-SPILL OUTSIDE ILLINOIS
Corporate	✓ 312-957-7600
Chicago Division	✓ 312-709-0333
Michigan Division	✓ 616-891-9273
Paul Carstens, Director of Safety	[redacted] [redacted]) 312-957-8171 (WORK)

Roy F. Weston, Inc. Contacts	
Chicago TAT	✓ 312-993-1067
Cleveland TAT	✓ 216-526-2484
Cincinnati TAT	✓ 513-772-3444
Detroit TAT	✓ 313-981-1880
Weston Medical Emergency Service	✓ 513-421-3063
Weston 24-hour Hotline	✓ 215-524-1925, 1926

PEI, Inc. Contacts	
PEI Zone Program Management Office	✓ 1-800-372-3727 EPA-ERCS

9.3 EMERGENCY EQUIPMENT AVAILABLE

The following emergency equipment is available on-site:

Communications Equipment — Location

Public Telephones: _____

Private Telephones: _____

_____

Mobile Telephones: _____

Two-Way Radios: _____

Medical Equipment

First Aid Kits: TAT Vehicle

Inspection Date: _____ By: _____

Stretcher/Backboard: _____

Eye Wash Station: _____

Oxygen: _____

Fire-Fighting Equipment

Fire Extinguishers: _____

Other: _____

Spill or Leak Equipment

Absorbent Boom/Pads: _____

Dry Absorbent: _____

Additional Emergency Equipment

_____

_____

9.5 Medical Emergencies:

Any person who becomes ill or injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket.) First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the OSC.

Any person being transported to a clinic or hospital for treatment should take with them information on the chemical(s) they have been exposed to at the site. This information is included in Attachment __.

Any vehicle used to transport contaminated personnel, will be tested and cleaned as necessary.

9.6 Fire or Explosion:

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival the OSC or designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on-site.

If it is safe to do so, site personnel may:

- o Use fire fighting equipment available on site to control or extinguish the fire; and,
- o Remove or isolate flammable or other hazardous materials which may contribute to the fire.

9.7 Spill or Leaks:

In the event of a spill or a leak, site personnel will:

- o Inform their supervisor immediately;
- o Locate the source of the spillage and stop the flow it it can be done safely; and,
- o Begin containment and recovery of the spilled materials.

9.8 Evacuation Routes and Resources:

Evacuation routes have been established by work area locations for this site. All buildings and outside work areas have been provided with two designated exit points. Evacuation should be conducted immediately, without regard for equipment under conditions of extreme emergency. See site map for evacuation routes.

- o Evacuation notification will be a continuous blast on an air horn, vehicle horn, or by verbal communication via radio.
- o Keep upwind of smoke, vapors or spill location.
- o Exit through the decontamination corridor if possible.
- o If evacuation is not via the decontamination corridor, site personnel should remove contaminated clothing once they are in a location of safety and leave it near the exclusion zone or in a safe place.
- o The OSC will conduct a head count to insure all personnel have been evacuated safely.
- o In the event that emergency site evacuation is necessary, all personnel are to:

  1. escape the emergency situation;
  2. decontaminate to the extent practical; and,
  3. meet at the office trailer.

- o In the event that the office trailer is no longer in a safe zone, meet: _____

_____.

10.0 CONFINED SPACE ENTRY PROCEDURES

A confined space is defined as a space or work area not designed or intended for normal human occupancy, having limited means of access and poor natural ventilation, and or any structure, including buildings or rooms which have limited means of egress. Examples include tanks, vats, and basements. Confined spaces identified at this site are listed below. If a confined space entry is conducted, it will be done in accordance with procedures presented in Attachment __.

Type of Confined Space	Location On-Site	Comments

ATTACHMENT A

SITE SAFETY PLAN AMENDMENTS

SITE SAFETY PLAN AMENDMENT #1: _____

SITE NAME: _____

DATE: _____

TYPE OF AMENDMENT: _____

REASON FOR AMENDMENT: _____

_____

_____

_____

ALTERNATE SAFEGUARD PROCEDURES: _____

_____

_____

_____

_____

REQUIRED CHANGES IN PPE: _____

_____

_____

_____

U.S. EPA, HSO INFORMED: _____

ERCS (HSO) CONTRACTOR INFORMED: _____

TAT RSO INFORMED: _____

CONFINED SPACE ENTRY PROCEDURES

I. Purpose

1. To establish requirements for safe entry into, continued work in and safe exit from confined spaces.

II. Definitions

1. Confined Space: A space or work area not designed or intended for normal human occupancy, having limited means of egress and poor natural ventilation; and/or any stucture, including buildings or rooms, which have limited means of egress.

2. Confined Space Entry Permit: A document to be initiated by the supervisor of personnel who are to enter into or work in a confined space. The Confined Space Entry Permit (CSEP) will be completed by the Response Manager or supervisor before personnel will be permitted to enter the confined space. The CSEP shall be valid only for the performance of the work identified and for the location and time specified. The beginning of a new shift with change of personnel will require the issuance of a new CSEP. A copy of the CSEP is attached for reference purposes.

3. Confined Space Observer: An individual assigned to monitor the activities of personnel working within a confined space. The confined space observer monitors and provides external assistance to those inside the confined space. The confined space observer summons rescue personnel in the event of emergency and assists the rescue team.

III. General

1. The Response Manager, with the concurrance of the On-Scene Coordinator, has the responsibility to issue the CSEP, to evaluate and monitor work performed within a confined space for possible hazards, and to determine the safety procedures, PPE and rescue equipment required.

2. When possible, confined spaces should be identified with a posted sign which reads: "Caution - Confined Space".

3. Only personnel trained and knowledgeable of the requirements of these Confined Space Entry Procedures will be authorized to enter a confined space or be a confined space observer.

4. A Confined Space Entry Permit (CSEP) must be issued prior to the performance of any work within a confined space. The CSEP will become a part of the permanent and official record of the site.

5. Natural ventilation shall be provided for the confined space prior to initial entry and for the duration of the CSEP. Positive forced mechanical ventilation may be required. However, care should be taken to not spread contamination outside of the enclosed area.

6. If flammable liquids may be contained within the confined space, explosion proof equipment will be used. All equipment shall be positively grounded.

7. The contents of any confined space shall, where necessary, be removed prior to entry. All sources of ignition must be removed prior to entry.

8. Hand tools used in confined spaces shall be in good repair, explosion proof and spark proof, and selected according to intended use. Where possible, pneumatic power tools are to be used.

9. Hand-held lights and other illumination utilized in confined spaces shall be equipped with guards to prevent contact with with the bulb and must be explosion proof.

10. Compressed gas cylinders, except cylinders used for self-contained breathing apparatus, shall not be taken into confined spaces. Gas hoses shall be removed from the space and the supply turned off at the cylinder valve when personnel exit from the confined space.

11. If a confined space requires respiratory equipment or where rescue may be difficult, safety belts, body harnesses, and lifelines will be used. The outside observer shall be provided with the same equipment as those working within the confined space.

12. A ladder is required in all confined spaces deeper than the employee's shoulders. The ladder shall be secured and not removed until all employees have exited the space.

13. Only self-contained breathing apparatus or NIOSH approved airline respirators equipped with a 5-minute emergency air supply (egress bottle) shall be used in untested confined spaces or in any confined space with conditions determined immediately dangerous to life and health.

14. Where air-moving equipment is used to provide ventilation, chemicals shall be removed from the vicinity to prevent introduction into the confined space.

15. Vehicles shall not be left running near confined space work or near air-moving equipment being used for confined space ventilation.

16. Smoking in confined spaces will be prohibited at all times.

17. Any deviation from these Confined Space Entry Procedures requires the prior permission of the On-Scene Coordinator.

IV. Procedure for Confined Space Entry Permits (CSEP)

The Response Manager shall:

1. Evaluate the job to be done and identify the potential hazards before a job in a confined space is scheduled.

2. Ensure that all process piping, mechanical and electrical equipment, etc., have been disconnected, purged, blanked-off or locked and tagged as necessary.

3. If possible, ensure removal of any standing fluids that may produce toxic or air displacing gases, vapors, or dust.

4. Initiate a Confined Space Entry Permit (CSEP) in concurrance with the On-Scene Coordinator.

5. Ensure that any hot work (welding, burning, open flames, or spark producing operation) that is to be performed in the confined space has been approved by the On-Scene Coordinator and is indicated on the CSEP.

6. Ensure that the space is ventilated before starting work in the confined space and for the duration of the time that the work is to be performed in the space.

7. Ensure that the personnel who enter the confined space and the confined observer helper are familiar with the contents and requirements of this instruction.

8. Ensure remote atmospheric testing of the confined space prior to employee entry and before validation/revalidation of a CSEP to ensure the following:

   a. Oxygen content between 19.5% - 23.0%.

   b. No concentration of combustible gas in the space. Sampling

will be done throughout the confined space and specifically at the lowest point in the space.

c. The absence of other atmospheric contaminants, if the space has contained toxic, corrosive, or irritant material.

d. If remote testing is not possible, Level B PPE is required as referenced in III. 13.

9. Designate whether hot or cold work will be allowed. If all tests in a. through c. in IV 8 are satisfactory, complete the CSEP listing any safety precautions, protective equipment, or other requirements.

10. Ensure that a copy of the CSEP is posted at the work site, a copy is filed with the project supervisor, and a copy is furnished to the On-Scene Coordinator.

The CSEP shall be considered void if work in the confined space does not start within one hour after the tests in IV 8 are performed or if significant changes within the confined space atmosphere or job scope occurs.

The CSEP posted at the work site shall be removed at the completion of the job or the end of the shift, whichever is first. The date and time shall be recorded on the form and the form filed as per IV 10.

V. Confined Space Observer

1. While personnel are inside the confined space, a confined space observer will monitor the activities and provide external assistance to those in the space. The observer will have no other duties which may take his attention away from the work or require him to leave the vicinity of the confined space at any time while personnel are in the space.

2. The confined space observer shall maintain at least voice contact with all personnel in the confined space. Visual contact is preferred, if possible.

3. The observer shall be instructed by his supervisor in the method for contacting rescue personnel in the event of an emergency.

4. If irregularities within the space are detected by the observer, personnel within the space will be ordered to exit.

5. In the event of an emergency, the observer must NEVER enter the confined space prior to contacting and receiving assistance from a helper. Prior to this time, he should attempt to remove personnel with the lifeline and to perform all other rescue functions from outside the space.

6. A helper shall be designated to provide assistance to the confined space observer in case the observer must enter the confined space to retrieve personnel.

* CONFINED SPACE ENTRY PERMIT

	Time Issued	Location	Validation Period

o be Performed ___ Hot ___ Cold	
ees (Name, Dept. No. I.D. No.	Supervisor and Dept.

TING OF ATMOSPHERE	(✓) SAFETY PRECAUTIONS REQUIRED		(✓) PROTECTIVE EQUIP REQUIRED
n Content _____ %	___Standby Observer	___Rescue Equipment	___Special Protective Clothing
ıtible Gas _____ % LEL	___Confined Space Cleaned of Hazardous Materials	___Lifelines and Harness	___Hearing Protection
Substance _____	___Confined Space Ventilated	___Power Driven Equip. Disconnected	___Eye Protection
_____	___Lighting	___Locked Out	___SCBA or Airline Respirator
	___Continuous Monitoring	___Blinds Installed, Piping	___Respirators:Types
	___O& Combustible Gas	___No Smoking	___
		___Burning/Welding Permit (Post with CSEP)	___Other Equipment:

dual Performing Testing	
IONAL COMMENTS/REQUIREMENTS	CSEP REMOVAL Date _____ Time _____
visor ature)	Health & Safety or Designee (Signature)

Copy - Posted at Confined Space Entry (2) Copy - Supervisor (3) Copy-Health & Safety Dept.

For Frostbite:

1. Wrap the victim in woolen cloth and keep dry until he or she can be brought inside.

2. Do not rub, chafe or manipulate frozen parts.

3. Bring the victim indoors.

4. Place the victim in warm water (102° to 105°F) and make sure it remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected parts if the victim has to go back out into the cold. The affected area may be refrozen.

5. Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.

6. Do not allow the victim to walk if his or her feet are affected.

7. Have the victim gently exercise the affected parts once they are thawed.

8. Seek medical aid for thawing of serious frostbite, because the pain will be intense and tissue damage will be extensive.

ATTACHMENT E

CHEMICAL HAZARD INFORMATION

Monsanto MATERIAL SAFETY DATA

NOTE
NO REPRESENTATION IS MADE AS TO THE ACCURACY OF THE INFORMATION AND RECOMMENDATIONS HEREIN. SEE PAGE 4 FOR CONDITIONS UNDER WHICH DATA ARE FURNISHED

MONSANTO COMPANY
800 N LINDBERGH BLVD
ST LOUIS, MO 63166
EMERGENCY PHONE NO
(CALL COLLECT)
(314) 694-1000

MONSANTO PRODUCT NAME

POLYCHLORINATED BIPHENYLS—PCB's*

*See page 4 for definition and notes

PRODUCT IDENTIFICATION

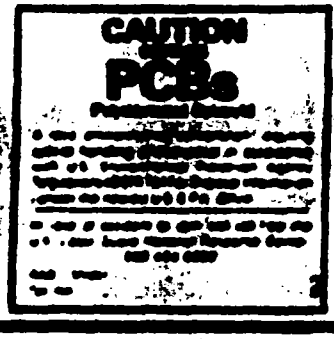
Synonyms	Trade Names (Commonly used Monsanto products)
PCB's	Askarel®*
Chlorodiphenyl (__% Cl)	Arochlor®* Series 1016, 1221, 1232, 1242, 1248, 1254, 1260
Chlorinated biphenyl	Pyranol®* Series
Polychlorinated biphenyl	Inerteen®* Series
Chlorinated biphenyls (approx. __% Cl)	Therminol®* FR Series

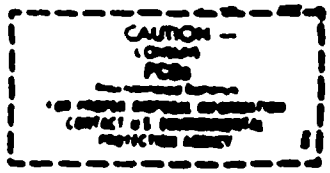
*See page 4 for notes

CAS No 001336363, 053469219, 021672298, 01100769, 011096825 and others

WARNING STATEMENTS

Federal regulations under the Toxic Substances Control Act require PCB's and PCB items to be marked. (Check regulations for details.*)





EMERGENCY AND FIRST AID PROCEDURES

Ingestion—Consult a physician. Do not induce vomiting or give any oily laxatives.
NOTE TO PHYSICIAN—If large amounts ingested, gastric lavage is suggested.

Skin—If liquid or solid PCB's are splashed or spilled on skin, contaminated clothing should be removed and the skin washed thoroughly with soap and water.
NOTE TO PHYSICIAN—Hot PCB's may cause thermal burns.

Eyes—Eyes should be irrigated immediately with copious quantities of running water for at least 15 minutes if liquid or solid PCB's get into them. A petrolatum-based ophthalmic ointment may be applied to the eye to relieve the irritating effects of PCB's.

Inhalation—Remove to fresh air. If skin rash or respiratory irritation persists, consult a physician. NOTE TO PHYSICIAN—If electrical equipment arcs over, PCB's or other chlorinated hydrocarbon dielectric fluids may decompose to produce HCl, hydrochloric acid, a respiratory irritant.

OCCUPATIONAL CONTROL PROCEDURES

Inhalation—Workplace exposure should be maintained below the OSHA eight-hour, time-weighted average Threshold Limit Value (TLV). At room temperatures, the hazard of inhalation is considered slight or absent. Chemical cartridge respirators or gas masks approved for protection against organic vapors are recommended in the event of spills or leaks of hot fluids. These will provide good protection up to the concentrations shown on the approval labels and the odor will give ample warning if it comes through the device. Self-contained breathing apparatus should be worn when PCB's are encountered in an enclosed space.

Threshold Limit Value (TLV)—Chlorodiphenyl (42% chlorine) 1.0 mg/cu.m.
Chlorodiphenyl (54% chlorine) 0.5 mg/cu.m.

Skin Contact—Avoid prolonged or repeated skin contact. Where employees may come into direct contact with PCB's, protective clothing impervious to PCB's should be worn. Gloves, boots, overshoes and bib-type aprons that cover the boot tops should be used when necessary. This protective equipment should be regularly inspected for defects and to ensure that it is in clean and satisfactory working condition. Contaminated clothing, gloves, etc., should be disposed of as prescribed by regulations.

Eye Contact—Eye protection should be used where there is a possibility of liquid splashes.

Ingestion—Ingestion of these materials is generally not a problem in industry.

PHYSIOLOGICAL EFFECTS SUMMARY:

Skin Contact—Can be absorbed through intact skin. Local action on skin is similar to that of common organic solvents where contact leads to removal of natural fats and oils with subsequent drying and cracking of the skin. A potential exists for the contracting of chloracne.

Eye Contact—The liquid products and their vapors are moderately irritating to eye tissues.

Ingestion—The acute oral toxicities of the undiluted compounds are LD_{50} rats—8.66 gm/kg for 42% chlorinated and 11.9 gm/kg for 54% chlorinated—"slightly toxic."

Inhalation—Animal experiments of varying duration and at different air concentrations show that for similar exposure conditions, the 54% chlorinated material produces more liver injury than the 42% chlorinated material.

Other—There are literature reports that PCB's can impair reproduction function in monkeys. A study reported in the literature with female rats using Aroclor® 1260 stated that Aroclor 1260 caused liver cancers. Monsanto sponsored animal feeding studies of Aroclor 1242, 1254 and 1260. These compounds, fed to both sexes of rats, did not produce cancers. The National Cancer Institute performed a study in 1977 using Aroclor 1254 with both sexes of rats. NCI stated that the PCB, Aroclor 1254 was not carcinogenic under the conditions of their bioassay.

The consistent finding in animal studies with PCB's is that they produce liver injury following prolonged and repeated exposure by any route, if the exposure is of sufficient degree and duration. Liver injury is produced first, and by exposures that are less than that alleged to cause cancer in rodents. Therefore, exposure by all routes should be kept sufficiently low to prevent liver injury.

FIRE PROTECTION INFORMATION

Fire and Explosion—Chlorinated biphenyls are essentially non-combustible compounds. They may decompose to form CO, CO_2, HCl, phenolics and aldehydes under severe conditions such as exposure to flame or hot surfaces. No phosgene is formed.

... fighting wearing apparel and self contained breathing apparatus should be worn when fighting ... exposure to chlorodiphenyls. Fire fighting equipment must be thoroughly cleaned ... after use

TABLE I—Properties of Selected Aroclors*

Property	1016	1221	1232	1242	1248	1254	1260
... (APHA)	—	30	00	100	100	100	150
... state	mobile oil	mobile oil	mobile oil	mobile oil	mobile oil	viscous liquid	sticky resin
Stability	inert	inert	inert	inert	inert	inert	inert
Density (g/ml 25 C)	11 40	9 95	10 55	11 50	12 04	12 82	13 50
Specific gravity at 15 5°C	1 36-1 37 at 25°	1 18-1 19 at 25°	1 27-1 28 at 25°	1 30-1 39 at 25°	1 40-1 41 at 65°	1 49-1 50 at 65°	1 55-1 56 at 90°
Distillation range, °C*	323-356	275 320	290-325	325-366	340-375	366-390	385-420
Acidity (mg KOH g maximum	—	014	014	015	010	010	014
...	none to boiling point	176	238	none to boiling point	none to boiling point	none to boiling point	none to boiling point
... (100 F	71-81	1a 41	44-51	82 92	185-240	1400-2500	—

REACTIVITY DATA

PCB's are very stable, fire-resistant compounds.

SPILL, LEAK & DISPOSAL INFORMATION

If PCB's leak or are spilled, the following steps should be taken immediately

All non-essential personnel should leave the leak or spill area

The area should be adequately ventilated to prevent the accumulation of vapors

The spill or leak should be contained. Loss to sewer systems, navigable waterways and streams should be prevented. Spills/leaks should be removed promptly by means of absorptive material such as sawdust, vermiculite, dry sand, clay, dirt or other similar materials or trapped and removed by pumping or other suitable means (traps, drip pans, trays, etc.)

Personnel entering the spill or leak area should be furnished with appropriate personal protective equipment and clothing as needed

Personnel trained in the emergency procedures and protected against the attendant hazards should shut off sources of PCB's, clean up spills, control and repair leaks and fight fires in PCB areas

All wastes and residues containing PCB's (e.g., wiping cloths, absorbent material used, disposable protective equipment, clothing, etc.) should be collected, placed in proper containers, marked and disposed of in a manner prescribed by EPA regulations (40 CFR 761)

Federal, state and local regulations may require reporting of PCB spills. Consult your attorney or appropriate regulatory officials for information relating to spill reporting.

Monsanto MATERIAL SAFETY DATA

NOTE:
ALTHOUGH THE INFORMATION AND RECOMMENDATIONS SET FORTH IN THIS SHEET ARE BELIEVED TO BE CORRECT AS OF THE DATE HEREOF, MONSANTO COMPANY MAKES NO REPRESENTATION AS TO THE COMPLETENESS OR ACCURACY OF SUCH INFORMATION AND RECOMMENDATIONS. MONSANTO COMPANY SHALL IN NO EVENT BE RESPONSIBLE FOR ANY DAMAGES OF WHATSOEVER NATURE DIRECTLY OR INDIRECTLY RESULTING FROM THE PUBLICATION OR USE OF OR RELIANCE UPON SUCH INFORMATION AND RECOMMENDATIONS.

NO WARRANTY, EITHER EXPRESS OR IMPLIED, OR MERCHANTABILITY OR FITNESS OR OF ANY OTHER NATURE WITH RESPECT TO THE PRODUCT OR TO THE INFORMATION AND RECOMMENDATIONS HEREIN IS MADE HEREUNDER.

This form has been approved by the Occupational Safety and Health Administration as "equivalent to" OSHA Form 20.

*POLYCHLORINATED BIPHENYLS

For regulatory purposes, under the Toxic Substances Control Act the term "PCB's" refers to a chemical substance limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain 50 ppm (on a dry weight basis) or greater of such substance (40 CFR 761).

Chemically, however, PCB's are defined as a series of technical mixtures, consisting of many isomers and compounds that vary from mobile oily liquids to white crystalline solids and hard non-crystalline resins. Technical products vary in composition, in the degree of chlorination and possibly according to batch.

The mixture generally used contains an average of 3 atoms chlorine per molecule (42% chlorine) to 5 atoms of chlorine per molecule (54% chlorine). They are used as dielectric fluids in transformers and capacitors. Prior to 1972, PCB applications included heat transfer media, hydraulic and other industrial fluids, plasticizers, carbonless paper, paints, inks and adhesives. "Federal regulations now specify that non-totally enclosed PCB activities are permitted only if specifically exempted or authorized." (40 CFR 761 see FEDERAL REGISTER, Vol. 44, P. 31514, May 31, 1979)

CAS No. 001336363: For general class of compounds

TRADE NAMES

**ASKAREL—Generic name for a broad class of fire-resistant synthetic chlorinated hydrocarbons used as dielectric fluids.

* Registered trademark of Monsanto Company
** Registered trademark of General Electric Company
*** Registered trademark of Westinghouse Electric Corporation

This list of trade names is representative of several commonly used Monsanto products (or formulated with Monsanto products). Many other trademarked products were marketed by Monsanto and other chemical manufacturers. PCB's were also manufactured and sold by several European and Japanese producers. Contact the manufacturer of the trademarked product directly, if not in this listing, to determine if the formulation contained PCB's.

DATE September 16, 1988	REVISED	X	SUPERCEDES All prior to 9/1/80

FOR ADDITIONAL NON-EMERGENCY INFORMATION, CONTACT

John H. Craddock, Manager,
Product & Environmental Safety
Monsanto Industrial Chem. Co.
800 North Lindbergh Boulevard
St. Louis, Missouri 63166
(314) 694-4764

80-010

MATERIAL SAFETY DATA Monsanto

ATTACHMENT B

SITE SAFETY PLAN

ACCEPTANCE FORM

SITE SAFETY PLAN ACCEPTANCE FORM

I have been informed and understand and will abide by the information and procedures set forth in the Safety and Health Plan and Amendments for the Bristol Cogeneration Project site.

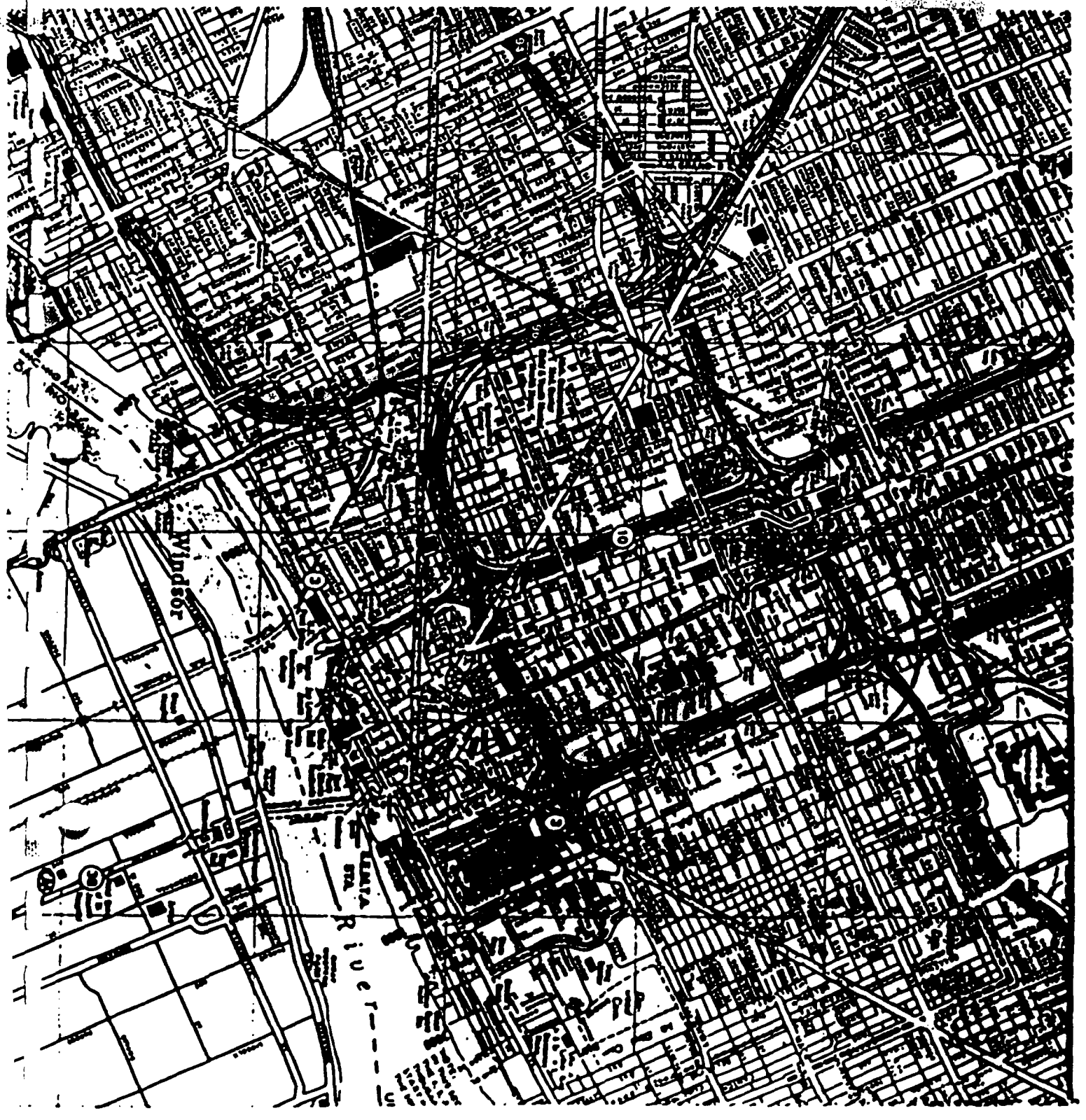
Printed Name	Signature	Representing	Date
GREG DANIELS	Greg Daniels	Inland Waters	3-18-88
Ewan Fosgate	Ewan Fosgate	" "	3-18-88
Rick Pinkerton	Rick Pinkerton	Inland Waters	3-18-88
Richard Rand Jr.	Richard Rand	" "	" "
Daniel M. Capone	Daniel M. Capone	Weston	3-18-88
Robert W Bowles	Robert W Bowles	CPA	3-18-88
Mike Turnbull	Mike Turnbull	Weston	3-18-88
Hal Schmitz	Hal Schmitz	Inland Waters	3/18/88

ATTACHMENT C

SITE MAPS

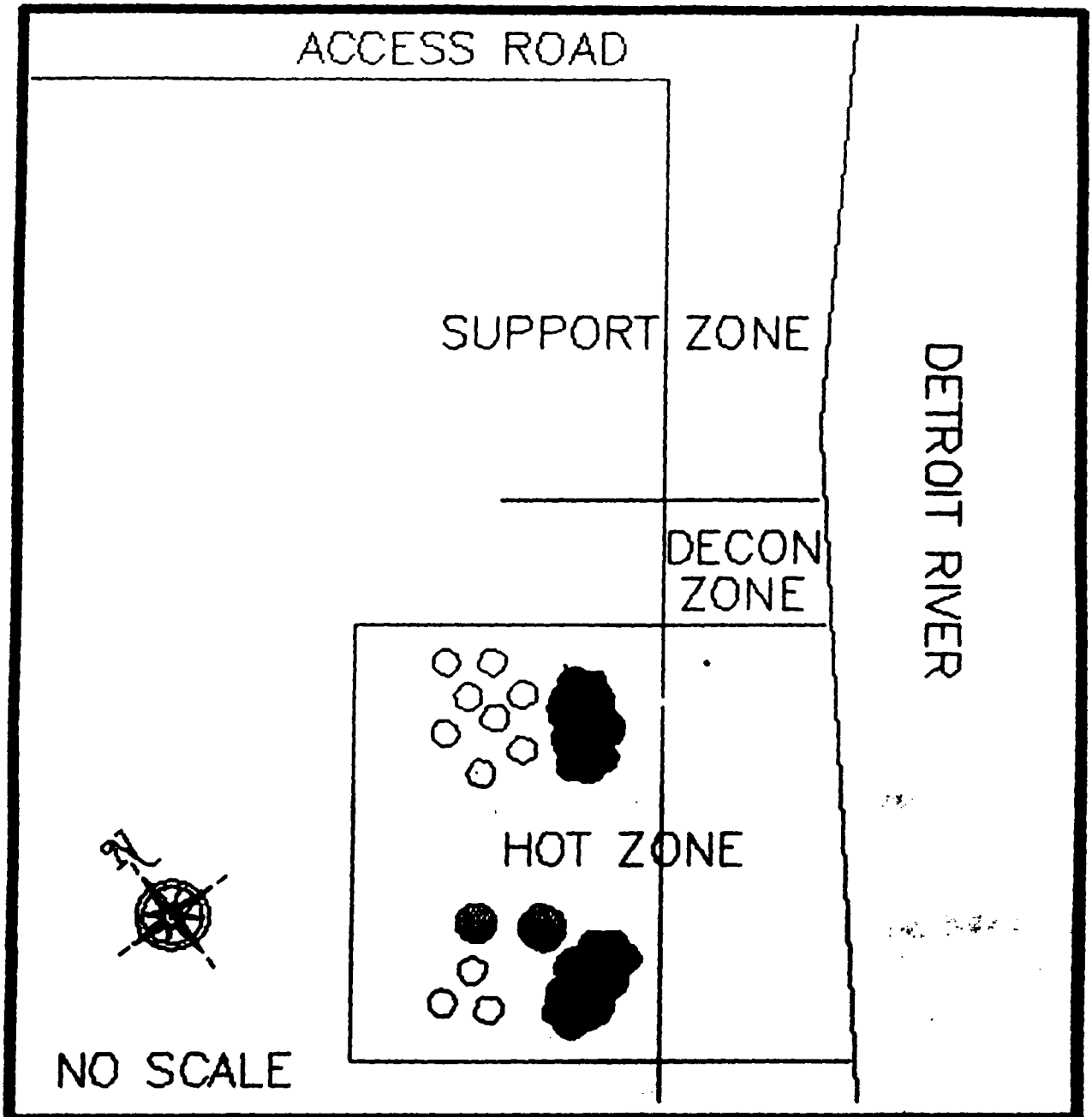
DIRECTIONS TO SITE:
I-96 east to I 75 south [redacted] exit at [redacted]
[redacted] Livernois Ave. south
Livernois Ave. south to W. Jefferson (5851 W. Jefferson)

— N →



DIRECTIONS TO HOSPITAL:
W. Jefferson to Livernois north
Livernois north to I-75 North
I-75 north to Medical Center exits (Mack Ave. and Canfield Ave.)
Follow signs to EMERGENCY ENTRANCE.

N



KEY

- DRUMS
- TRANSFORMER CARCASSES
- PCB OIL

WESTON
MANAGERS DESIGNERS/CONSULTANTS

DRAWN	DATE	PCS #
D. Capone	3/17/88	
APPROVED	DATE	TDD #

ATTACHMENT D

COLD STRESS

HYPOTHERMIA AND FROSTBITE

A. Symptoms:

When exposed to cold temperature and/or cold water, the body reacts instinctively in a pattern designed to preserve itself. It resorts to involuntary reactions originating in the brain. When the brain recognizes any dangerous temperature drop in the body core, it signals the body to make adjustments to compensate for the imbalance. First, in an attempt to preserve normal temperatures in the vital internal organs, the blood vessels in the extremities constrict (vasoconstriction). This slows the blood flow to the arms and legs, preserving that energy and warm blood for the body core. If there is continued heat loss and if the body core temperature drops below 95°F (35°C), the body then tries to generate more heat through shivering, which causes metabolic heat production to increase to several times the normal rate. This is the first real warning sign of hypothermia. Further heat loss, accompanied by a body core temperature drop to 90°F (32.2°C) or below, results in speech difficulty, loss of manual dexterity, slow reactions, mental confusion and muscle rigidity (muscle hypertonus). If exposure continues further until the body's resources are exhausted and if the cold blood reaches the heart and the brain, heart failure and coma will result and lead inevitably to death. Death occurs when the body core temperature falls below 78°F (25.6°C).

If exposure occurs in temperatures which are below freezing (30°F or below), frostbite or trench foot (immersion foot) may accompany or complicate the symptoms of hypothermia. Frostbite is the freezing of living tissues with a resultant breakdown of cell structure. Injury due to frostbite may range from superficial redness of the skin, slight numbness and blisters, to the obstruction of blood flow (ischemia), blood clots (thrombosis) or skin discoloration due to insufficient oxygen in the blood (cyanosis). Frostbite may occur if the skin comes into contact with objects whose surface temperature is below freezing, such as metal tool handles. Trench foot is caused by continuous exposure to cold combined with persistent dampness or immersion in water. Injuries in this case include permanent tissue damage due to oxygen deficiency, damage to capillary walls, severe pain, blistering, tissue death and ulceration. Additionally, cold exposures may either induce or intensify vascular abnormalities. These include chilblain (a swelling or sore), Raynaud's disease, acrocyanosis (blueness of hands and feet) and thromboangiitis (inflammation of the innermost walls of blood vessels with accompanying clot formation). Workers suffering from these ailments should take particular precautions to avoid chilling.

Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration). These effects may last up to three years.

B. Treatment:

If hypothermia occurs, certain first aid procedures can mean the difference between life and death for the victim. These include the following (as a general rule, treat all injuries in the order of their importance to preserving life):

For Hypothermia:

1. Give artificial respiration and stop any bleeding, if necessary.
2. Bring the victim into a warm room or shelter as quickly as possible.
3. If the victim cannot be moved (spinal injury, etc.) carefully place newspapers, blankets or some other insulation between him and the ground.
4. Remove all wet clothing.
5. Provide an external heat source, for the body cannot generate its own heat. Wrap the victim in prewarmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water or use body-to-body contact to rewarm the body core. These measures will slowly reopen the peripheral circulation so as to minimize the possibility of after-shock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest or death.
6. Do not allow the victim to sleep.
7. Give warm, sweet drinks -- no alcohol or pain relievers.
8. Keep the victim still. Do not try to walk.
9. Do not rub numb skin.
10. Get medical help as soon as possible.